Notebook, N-09-03-24

			25
Dup 8415 21% KOH, 2 grams LiOH -	8418	667	970
	8419	697	980
	8420	1027	1160
Edison 41 Conc $NiCl_2$ soak 719 - 1 quickwash-boil KOH, did it twice 2 soaks breaks up - 21% KOH.	8421	917	980
	8422	913	990
	8423	830	907
Dup 8421 21% 2 LiOH -	8424	1027	1147
	8425	1010	1130
	8426	1007	1123
Edison 38 RA 719 Orthophosph - BaCl - 1 soak Cant wash free 21% KOH. 4.5 f 1/2 23.7	8427	1023	970
	8428	1050	990
	8429	1057	983
Dup 8427 21% 2 LiOH -	8430	920	513
	8431	890	467
	8432	897	—
Edison 43 KMolybdate, BaCl one soak 719 RA - 4.2 1/2 f 24.2 21%	8433	640	1063
	8434	593	1053
	8435	593	1050
Dup 8433 21% KOH - 2 grams LiOH.	8436	943	1077
	8437	913	1067
	8438	917	1027
Edison 44 SrCl - KSO4 - one soak - f 1/2 4.4 - 23.8 green 719 - thrown 21% KOH - 6.24	8439	1210	1220
	8440	1207	1217
	8441	1217	1220

Co

Co

Co

Co

Co

			25
Dup 8439 21% KOH. 2 grms LiOH.	8442	1127	1237
	8443	1130	1257
	8444	1133	1267
Edison 45 Bario Stannate ~~Soda~~ BaCl single soak No 2 ½ f 24 gr 4.2 23.9. 21% KOH.	8445	1273	1213
	8446	1277	1210
	8447	1290	1217
Dup 8445 21% KOH. 2 grms LiOH.	8448	1147	1233
	8449	1150	1257
	8450	1133	1283
Edison Conc Antimonite Potash BaCl - one soak - 21% KOH.	8451	767	843
	8452	770	847
	8453	760	840
Dup 8451 21% KOH. 2 grms LiOH —	8454	727	1017
	8455	740	1027
	8456	767	1083
Reg tubes 4.4 ½ f - 24.4 green 719 Ra - 3 or 4 grams Bismuth hydrox in each cell - 21% 2 LiOH —	8457	1177	1357
	8458	1173	1297
	8459	1173	1287
green used in 8081 - 4.2 ½ f 24 green 27% KOH 2 grms [illegible] LiOH —	8460		1350
	8461		1380
	8462		1370
~~Reg~~ 719 Ra shown used with Reg ½ f 4 fl 24 green the flake treated with [illegible] HCl - washed & dried 1st Run 619 - 21% KOH.	8463	1243	1167
	8464	1220	1107
Dup 8463 - 21% KOH 2 grms LiOH.	8465	1210	

acid

Co

3)3773
1258

3)3721
1240

3)3127
1042

8481 Starts with No 3 flake which is ½ black square, ox & Reduced by Zinc Hydro purified 25

Dup 8463	8466	1197	1337
21% KOH 2 grams LiOH.	8467		
	8468		
Reg tubes 1½ 3½ 237	8469	1227	1200
½ sq of ox-treated 10 grams fl 18 drops Nitric acid washed –	8470	1210	1173
21% KOH.	8471	1200	1160
Dup 8469	8472	1220	1347
21% KOH. 2 grams LiOH –	8473	1210	1367
	8474	1220	1333
Dup 8469	8475	1187	1123
Except flake treated HCl – 8 drops 10 grams fl 100 cc H_2O	8476	1183	1150
21% KOH.	8477	1200	1193
Dup 8475	8478	1200	1323
21% KOH. 2 grams LiOH.	8479	1197	1280
ZnH on flake	8480	1207	1323
Reg tubes 1½ 3½ 237 6.39 Sq of ½ ox black just beyond peacock	8481	1217	1170
Zinc Hydrogen $CuSO_4$ – CrO_3 – KOH, glacial – very dull red – 1 hour	8482	1220	1137
& bright = acid treatment no Al_2O_3 or Fe 21% K 719 RA 2 hours 4.2 / 24.3	8483	1207	1137
Dup 8481 flake about usual bulk –	8484	1200	1267
21K 2 LiOH	8485	1207	1257
6.39	8486	1200	1267

acid treatment of flake removes Al_2O_3 & Iron

Dup 8481 Except tube stock welded Zinc Hydrogen 719 2 hours 21K	8487	1157	1150
	8488	1153	1107
	8489	—	
Dup 8487 21K 2 LiOH.	8490	1183	1293
	8491	1167	1287
	8492	—	
Rag tubes No3 ft 4.3 24.3 719 2 hours – about 10 grams + 8 drops Nitric acid. 100 H_2O 21K	8493	1200	1150
	8494	1217	1150
	8495	1200	1110
Dup 8493 21K 2 LiOH.	8496	1200	1257
	8497	1193	1277
	8498	1213	1277
Dup 8493 But same amount flake 16 drops Nitric — 21K	8499	1217	1157
	8500	1200	1150
	8501	1200	1157
Dup 8499 21K 2 LiOH.	8502	1190	1273
	8503	1193	1300
	8504	1183	1257
Rag tubes 4.4 ½ Zinc flake dyr – RA 720 ½ w fittings) Dried loose heat – 21K	8505	1180	1170
	8506	1173	1168
Dup 8505 21K 2 LiOH.	8507	[illegible]	
	8508	1173	1333
Dup 8505 27%K 2 LiOH.	8509	1187	1343
	8510		

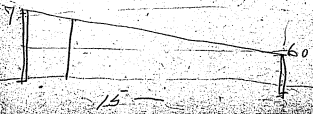
Dup 8505 27 % KOH 6 gm LiOH	8511	1297	1230
	8512	1330	1
	8513	1280	
Reg tube RA 721 ½ w filtered - dried low heat - filtered in filter press looks like 708 & not like 707 4.4 f ½ new f beaker	8514	1213	1218
	8515	12	1227
6.77	8516		1213
Dup 8514 21 K 2 LiOH	8517		
	8518		
	8519		
Tube stock welded Zinc Hydrogen 719 RA 2 hours 21 K	8520		
	8521		
	8522		
Dup 8520 21 K 2 LiOH	8523		
	8524		
	8525		
Dup 8520 but use 4 fl which has not been oxidized but which been burnt up in Hydrogen Zn -	8526	7 6 Gauze Too flat	
	8527	Weldout fixed	
	8528		
	~~8529~~		
	~~8530~~		
	~~8531~~		
Dup 8520 Tube stock welded Zn Hydgn but RA 720 used 4.4 ½ f gen rock 24.3	8532		
	8533		
	8534		

Dup 8532 21K 2 LiOH.	8535 8536 8537
Dup 8520 but use RA 721 filtered in filter, [illegible] tube [illegible] [illegible] ZnH! 4.4 ½ [illegible] 21K	8538 8539 8540
Dup 8538 21K 2 LiOH.	8541 8542 8543
Dup of 8337 Reg tubes 4.4 f -24 grn	8544 8545 8546
Reg tubes No 3 f ½ [illegible] 721 RA washed by Decantation ½ w filtered, low heat 6.47	8547 8548 8549
Dup 8547 21K 2 LiOH.	8550 8551 8552
Reg tube RA 721 ½ W filtered. washed Decantation 4.4 ½ f [illegible]. light color like 708 6.35	8553 8554 8555
Dup 8533 21K 2 LiOH.	8556 8557 8558

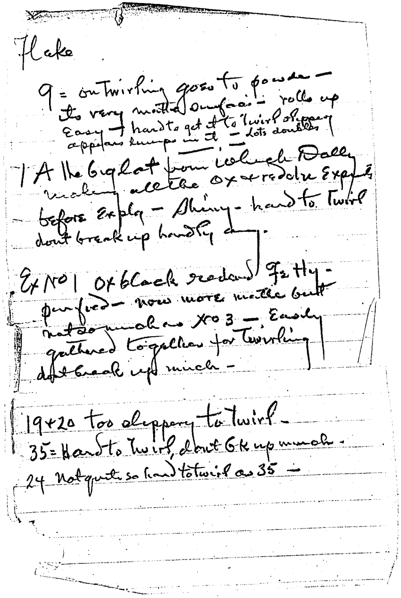
	^{25} Liok
Ca Fl	1338 —
Bifurcated tube —	1313
$BaSO_4$ with H_2O added on paper	1331
$HgCl_2$ then NH_4 —	1300
BiOH eq in Electricity	1338
" 1 gr. "	1322
" 400 milg "	1332
" 200 " "	1293
$SrSO_4$	1308
768 - $SrSO_4$ —	1305
Flame HCl —	1337
" & HNO_3	1373
" & HCl	1308
$SrSO_4$ —	1342
$BaCrO_3$ —	1340
Tubes soak in NH_4Cl	1293 — $\overset{50}{1335}$
Mg 2 ——	1324
" 4 "	1330

$$\frac{2/2586}{1293}$$

36 mils 600 daily =
6000
216,000



[ITEM FOUND IN BOOK]



Flake

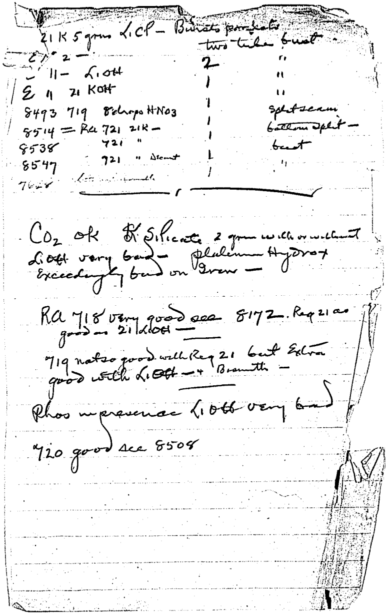
9 = on twirling goes to powder —
its very matte surface — rolls up
Easy + hard to get it to twirl slippery
appears lumps in it — Lots doubles

1A the big lot from which Dolly
making all the Ox + residue Exps
before Explq — Shiny — hard to Twirl
dont break up hardly any.

Ex No 1 Ox black residue Fe Hy-
purified — now more matte but
not so much as No 3 — Easily
gathered together for twirling
dont break up much —

19+20 too slippery to twirl —
35 = Hard to twirl, dont bk up much —
24 Not quite so hard to twirl as 35 —

[ITEM FOUND IN BOOK]



21 K 5 grms LiCl — Bursts [illegible]

	two tube burst	
E1 2 —	2	"
" 11 — LiOH	1	"
E " 21 KOH	1	"
8493 719 8 drops HNO3	1	Split seam
8514 = Ra 721 21K —	1	bottom split —
8538 721 "	1	burst
8547 721 " Dismount	1	"
7628 [illegible]	1	

CO_2 ok K Silicate 2 grm with or without LiOH very bad — platinum Hydrox Exceedingly bad on Iron —

RA 718 very good see 8172. Reg 21 as good as 21 LiOH —

719 not so good with Reg 21 but Extra good with LiOH — + Bismuth —

Phos in presence LiOH very bad

720 good see 8508

[ITEM FOUND IN BOOK]

22 - Can hardly twirl -
23 " "
21 Hard to twirl breaks up -
4 Easy to twirl breaks up
8+10 Can hardly twirl -
5+7 Hard to twirl -

[ITEM FOUND IN BOOK]

1 A 6x6lk unpurified [illegible] –

800 Fahr

1 Hour	1274 Φ	
2 hours	1251	
4 hours	1274 Φ	1270

700 Fahr

1 Hour	1266	
2 "	1288 Φ	
4 "	1233	1267

1000 Fahr

1 Hour	1240	
2 "	1283 Φ	
4 "	1246.	1256

[illegible]ulte f H_2O wash only

[illegible] hours	1298
[illegible] "	1277

[illegible]gh flake H_2O wash only

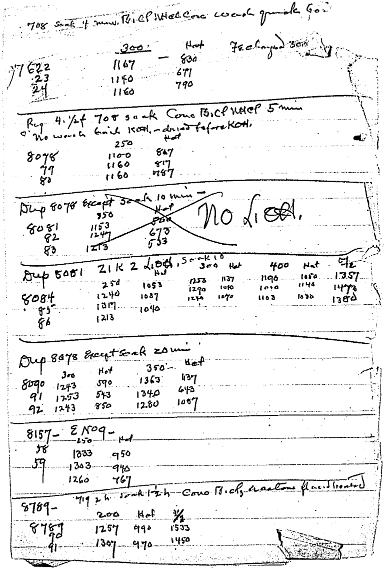
[illegible]ours	1257	1223
[illegible]ours	1269	1240

[ITEM FOUND IN BOOK]

100

		grm		
725A.	7354	6.21	1218	1.96
[illegible]B	7422	6.32	1305	2.06
" C	7551	6.43	1341	208
D	7669	6.52	1329	204
E	7813	6.64	1322	200
F	8069	6.85	1358	198
SG	6432	5.47	1114	203
X	8127	6.92	1331	192
SH.	7266	6.18	1236	200
SJ	7429	6,32	1277	202
SL	7368	6,32	1250	198
1088A	7164	6.10	1347	221
1086 A	8041	6.85	1378	201
1088B	7009	5.97	1290	216
1086B	7965	6.77	1352	200
1089B	6034	5,14	1030	200
25 SM	7477	6.35	1332	210
Y	8100	6.90	1383	200

[ITEM FOUND IN BOOK]



708 Soak 4 min. BiCl HCl Conc wash quick Go.

	300	Hot	Fe changed 500
7622	1167 —	830	
23	1140	671	
24	1160	790	

Rep 4.1/2 f 708 soak Conc BiCl HCl 5 min
No wash boil KOH. – dried before KOH.

	250	Hot
8078	1100	847
77	1160	817
80	1160	787

Dup 8078 ~~Except soak 10 min –~~ No LiOH.

	350	~~Hot~~
8081	1153	~~500~~
82	~~1247~~	~~673~~
83	~~1213~~	~~533~~

Dup 8081 ZIK 2 LiOH, Soak 10

	250	Hot	300	Hot	400	Hot	5/2
8084	1240	1053	1253	1137	1190	1050	1357
85	1317	1087	1290	1140	1010	1146	1473
86	1213	1040	1270	1070	1103	1030	1380

Dup 8078 Except soak 20 min

	300	Hot	350	Hot
8090	1243	590	1363	1137
91	1253	543	1340	643
92	1243	850	1280	1087

8157 – ENO9 –

	250	Hot
58	1333	950
59	1303	940
	1260	767

8789 – 719 2h soak 1½h Conc BiCl₂ acetone fluid treated

	200	Hot	3/1
8789	1257	990	1533
90	1307	970	1450
91			

[ITEM FOUND IN BOOK]

8822
23

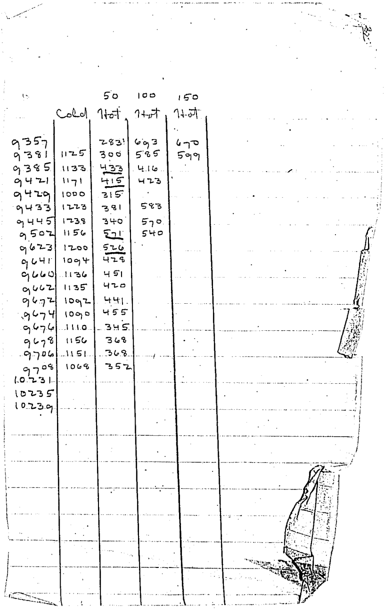
[illegible] flakes [illegible] not [illegible] after tubes
[illegible] [illegible] [illegible] acetone [illegible]
propyl KOH [illegible]

	200	Hot	1/2	300	Hot	1/2
8822	1397	860	1553	1257	1000	1490
23	1300	900	1550	990	993	1557

E 109 719-2-h Soak 1/2 hour $Bi(NO_3)$ acetone
Cacs KOH, no heat,

	200	Hot	300	Hot	1/2
9116	1410	1107	1267	983	1397
17	1410	1040	1333	1033	1437

[ITEM FOUND IN BOOK]



		50	100	150
	Cold	Hot	Hot	Hot
9357		283	693	670
9381	1125	300	585	599
9385	1133	433	416	
9421	1171	415	423	
9429	1000	315		
9433	1223	381	583	
9445	1238	340	570	
9502	1156	571	540	
9623	1200	526		
9641	1094	428		
9660	1136	451		
9662	1135	420		
9672	1092	441		
9674	1090	455		
9676	1110	345		
9678	1156	368		
9706	1151	368		
9708	1068	352		
10231				
10235				
10239				

[ITEM FOUND IN BOOK]

Mr Edison -

Do I understand from your note that all Green will have to be tested 150 hot runs before it can be used in the large cells, or am I to go ahead and make NiO_2H_2 for Rodgers the same way as I made #719-2hrs, get 50 hot runs, and if O.K. use in the large cells?

Had I not better go ahead and make one batch every week (350 lbs) and get tests on it so when Rodgers is ready I will be ready, and there will be no holdups at this end?

I will make one batch every week to duplicate #719-2hrs until we find something better and then we can change.

Kindly let me know about this by return mail so I can get started at once, for it takes a long time to get tests. (4 weeks for each 50)

R-A.

[ITEM FOUND IN BOOK]

West Orange, N.J.
March 9, '09.

Mr Edison.

Dear Sir:-

The following tubes went up to Hooper. #1014A. Dup. of #9710 Except throw 30 on 190 mesh, and Lot 104 Stock 20A Ni flake.
Flake 4.2 Green 24.0 #1 Machine.
21% KOH + 2 gms LiOH. Run Regular.
275 dumps wt 7.773
1015A. 280 " wt 7.805

1016A. Dup. of #9716 Except throw 30 on 190 mesh, and Lot 104 Stock 20A ~~Ni~~ flake
Flake 4.2 Green 24.0 #1 Machine.
21% KOH + 2 gms LiOH. Run Regular.
264 dumps wt 7.122
1017A. 263 " wt 7.132

1018A. Dup. of #9722 Except throw 30 on 190 mesh and Lot 104 Stock 20A ~~Ni~~ flake.

[ITEM FOUND IN BOOK]

2.

Flake 4.2 Green 23.9 #1 Machine.
21% KOH + 2. gms LiOH. Run Regular.
261 dumps wt 7.196
~~[illegible]~~ #1019A. 260 " wt 7.219

1020A. Dup. of #9728 Except threw 30 pw 190 mesh,
and Lot 104 Stock 20A ~~in~~ flake.
Flake 4.2 Green 23.9 #1 Machine.
21% KOH + 2. gms LiOH. Run Regular.
282 dimps wt 7.750
1021A. 278 " wt 7.744

The following are some of the loading weights of Arbogasts green's that ran below 7.000 gms. per tube.

RA #1182 Green 23.8 flake 4.2 dumps 224 wt 6.069
" " 1189 " 23.8 " 4.2 " 231 " 6.282
" " 1191 " 23.7 " 4.2 " 243 " 6.370
" " 1192 " 23.7 " 4.2 " 229 " 5.943
" " 1194 " 23.8 " 4.2 " 253 " 6.640
" " 1195 " 23.8 " 4.2 " 235 " 6.415

[ITEM FOUND IN BOOK]

RQ
. 1196 lo Exp. Green 23.7 Flake 4.2 dumps 233 wt 6.128
" 1198 " " " 23.8 " 4.2 " 258 wt 6954

There are a couple of more to make up which I will send to-morrow.

Yours Respectfully.
Walter. Urecker.

P.S. I told John Utt about fixing up the rolls so I could get rid of the fines through 190 mesh.

[ITEM FOUND IN BOOK]

2/4/09.

Here are results on two, similar, old-loaded cells, — one having 100 grams of SiOH in the 21 % KOH, and the other having the regular 120 grams.

Cells were run like #404, results of which I have sent you, — that is, they were given three overcharge runs and then run on commercial charges, as if in servis.

RUN	CHARGE	DISCHG.	#467		#466		
—	—	—	To 1V.	To .50	To 1V.	To .50	
			100 g.	SiOH	120 g.	SiOH	— in 21 % KOH.
1	48 hrs. @ 15	At 30	222.5	234	215	231.5	Cells contain:
2	15 hrs. @ 30	"	180.5	190	165	194.5	{ 735 $Ni(OH)_2$
	Allowed to stand 46 hours						{ 16A Flake
3	15 hrs. @ 30	At 30	178	191.5	165	196.7	I think these results
	Allowed to stand 36 hours						give evidence that it
4	7 hrs. @ 30	At 30	152.5	—	150	—	is advisable to use
5	"	"	161.5	—	160.7	—	less SiOH. The 120-
6	"	"	162.5	—	162.5	—	gram cell has more
7	"	"	164.2	—	163.5	—	reserve capacity
8	"	"	164	—	161.2	—	below 1V. and event-
9	"	"	167	—	165	—	ually it will prob-
10	"	"	168	—	166.5	—	ably have a capac-
11	"	"	166.2	—	166	—	ity to 1V. 10 ampere-
12	"	"	167.7	—	167.5	—	hours or so better
13	"	"	169.2	—	169.3	—	than the 100-gram
14	"	"	168	—	168	—	cell; but these ad-
15	"	"	169.5	182	170	198.5	vantages are slight
16	15 hrs. @ 30	"	193.5	204.5	196	218.7	compared with the
17	7 hrs. @ 30	"	163.7	—	168.2	—	better durability
18	"	"	171.2	—	175.8	—	which, I believe, the
19	"	"	172.5	—	175.5	—	100-gram cell will
20	"	"	172	—	175	—	have. W.E.H.

[ITEM FOUND IN BOOK]

March 4, 1909.

Mr. Edison:

Below are the first three runs of three cells containing the new-loaded tubes. These cells contain different amounts of SiOH in 21%. KOH, but this makes little difference in their capacities at the start. It is the same with the old cells. These new cells, however, are starting out a little lower than the average cell of the old loading. I did not have any old cells of the same Flake and Hydrate which is in these, and that may account for the difference. Anyway it is the ultimate and not the first capacity which counts.

New-loaded cells #478, 479, + 480, contain:

#478 – 739 Ni$(OH)_2$, 28 XN + 203 BN Flake, 90 grams SiOH
479 – " " 105 grams SiOH
480 – " " 120 grams SiOH

RUN	CHARGE	DISCHG.	#478		#479		#480	
			To 1V.	To .50	To 1V.	To .50	To 1V.	To .50
1	48 hrs. @ 15	At 30	210.7	220.7	207	221.2	202.5	219.7
2	15 hrs. @ 30	"	178.5	187.2	168.5	185.7	169.2	185.2
3	"	"	173.5	183.7	165	183.7	170	185.5

Walter E. Holland

[ITEM FOUND IN BOOK]

March 6, 1909.

Mr. Edison:

On December 4th we put six "A4" cells in servis, in a Fonograf-Co. truck – as you will remember. A few days ago they completed 1000 miles (taking 12 weeks time), and I had them taken out for test. Here are the results on the last run before, and on four runs after, the servis in truck:

RUN	CHARGE	DIS.	#231	#232	#376	#380	#387	#390
Before	15 hrs. @30	At 30	203	208.5	196	207.5	212.5	207.5
In truck 12 weeks; ran 1000 miles								
After	15 hrs. @30	At 30	228.5	231.5	228.5	231	237.5	232
"	"	"	192.5	194.5	187.5	198	204.5	208
"	"	"	195	197	189	202	206	210
"	"	"	192.7	194	187.5	201.5	205	210.5

Cells #231 + 232 contain #728 $Ni(OH)_2$ and #247 Flake
Others contain #731 $Ni(OH)_2$ and 19 + 29 Flake.

These cells were used in the beginning for various experiments as to forming. They were variously treated as follows:

#231 + 232.

Originally in 21 % KOH + 15 g. LiOH per cell. After 3 runs, saturated LiOH solution was put in. Cells were run 28 times in this and 21 % KOH was then substituted. Cells had altogether 44 runs before being put in truck.

#376.

Original electrolyte – 21 % KOH + 120 g. LiOH
Had 20 overcharge runs during which new electrolyte of 21 % KOH was put in.

[ITEM FOUND IN BOOK]

(2)

#380.

Electrolyte – 21 %. KOH + 120 g. SiOH. Had 16 normal overcharge runs and was reverst once at 15 amperes for 30 hours. Solution has never been changed.

#387.

Electrolyte – 21 %. KOH + 120 g. SiOH. Had 15 normal overcharge runs. Solution has never been changed.

#390.

Original electrolyte – 21 %. KOH + 60 g. SiOH. Had 19 normal overcharge runs during which the solution was changed three times – fresh electrolyte of the same kind being put in each time.

Have got two more runs on the new-loaded cells. They are now on their upward course. Here are all the runs:

			#478		#479		#480	
RUN	CHARGE	DIS.	To 1V.	To .5V.	To 1V.	To .5V.	To 1V.	To .5V.
			90 g. SiOH		105 g. SiOH		120 g. SiOH	
1	48 hrs. @ 15	At 30	210.7	220.7	207	221.2	202.5	219.7
2	15 hrs. @ 30	"	178.5	187.2	168.5	185.7	169.2	185.2
3	"	"	173.5	183.7	165	183.7	170	185.5
4	"	"	178.5	189	170	190.5	175	192.2
5	"	"	178.5	190	173.5	191	178.5	196.5

Walter E. Holland

[ITEM FOUND IN BOOK]

March 10, 1909.

Mr. Edison:

Here are the runs to date of the three new-loaded cells:

			#478		#479		#480	
RUN	CHARGE	DISCHG	To 1V.	To .50	To 1V.	To .50	To 1V.	To .50
			90 g.	SiOH	105 g.	SiOH	120 g.	SiOH
1	48 hrs. @ 15	At 30	210.7	220.7	207	221.2	202.5	219.7
2	15 hrs. @ 30	"	178.5	187.2	168.5	185.7	169.2	185.2
3	"	"	173.5	183.7	165	183.7	170	185.5
4	"	"	178.5	189	170	190.5	175	192.2
5	"	"	178.5	190	173.5	191	178.5	196.5
	Allowed	cells to stand 51 hours.						
6	15 hrs. @ 30	At 30	187.2	200	180	202	183	204.2
7	"	"	182	191.2	178.2	194.3	182.5	199
8	"	"	181	190	174.5	193	182.7	199.2

The two-day rest did not seem to help them much. Shall try them on short charge now.

We now have six more of the new cells; will send results on them as soon as I can get results.

We had a little cold weather last week and I got several cold tests on A4 cells. A cold discharge affects the output very considerably, while a cold charge (down to 40° F.) is not at all bad. I have curves on this which you can see when you return.

Walter E. Holland

[ITEM FOUND IN BOOK]

March 16, 1909.

Mr. Edison:

I think it would be *well* to try the effect of various catalytic substances on the charging-curve of iron as you suggest, but I do not think we should put the Fes up with Bismuth-Nickel tubes: that would be introducing too many unknown factors. Moreover, I don't see why we shouldn't eliminate the Nickel factor altogether: it can be done, as I have demonstrated, by assembling the Fes with inactiv electrodes of pure nickel and using an external source of current to both charge and discharge. The volt-readings on discharge of course are negativ, but they are constant; and the method gives the true and unadulterated curve of the iron both on charge and on discharge.

If you think favorably of this plan I will have the cells made up and you can send the list of chemicals at your convenience.

Respectfully yours
Walter E. Holland

[ITEM FOUND IN BOOK]

March 17, 1909.

Mr. Edison:

I gave 3 of the new-loaded cells the treatment with 8% KOH + 120 g. LiOH, - changed to 25% KOH after 3 runs; but this time I varied the treatment a little and discharged at 60 amperes on the 2nd and 3rd runs. You will notice that the output at this high rate is very low; but it heats the cells, with resultant benefit. These are better on the 5th run than old-loaded cells treated in the same way (except in the matter mentioned of high rate discharge).

RUN	CHARGE	DISCHG	#481		#482		#483	
—	—	—	To 1V.	To .50	To 1V.	To .50	To 1V.	To .50
	Original Electrolyte - 8% KOH + 120 g. LiOH.							
1	48 hrs. @ 15	At 30	140	169	147	175.7	151.7	180.2
2	15 hrs. @ 30	At 60	—	96	—	98.5	—	120
3	"	"	—	44.5	—	47.5	—	88
	Set stand 32 hours; then put in 25% KOH							
4	15 hrs. @ 30	At 30	166.5	189.7	168	190	168	186.7
5	"	"	170.5	190.7	172	191.2	172	189

The 3 original new-loaded cells I have been giving commercial runs, to form them; and they show up very well on these runs. They are running in series, and as we have no convenient way to cut them out at 1V., they get completely discharged each time, - therefore the efficiency should be figured from the results to .50 V.

Following are the results:

[ITEM FOUND IN BOOK]

(2) 3/17/09.

RUN	CHARGE	DISCHG	#478		#479		#480		
			To 1V.	To .50	To 1V.	To .50	To 1V.	To .50	
			90 g.		105 g.		120 g.		= SiOH in 21 % KOH.
9	7 hrs. @ 30	At 30	160.2	165.7	161.2	169.2	165.2	175.7	Runs #1 – 8 were
10	"	"	161.7	166.5	163.2	171.5	166.5	176.5	overcharge tests.
11	"	"	161.2	165.5	161.7	171	166.7	176.7	I sent them to you
12	"	"	160	166	162.5	171.5	165	178.5	last week.
13.	"	At 60	137	165	130	172.5	131.5	180	
14	"	"	136.5	164	130	168	130	178	
15	"	"	134.5	164	126	169	128	177	
16	"	"	140	167	133	173	134	180	
17	"	At 30	162	167.5	163	172.5	167	180.5	
18	"	"	161	165	162	170	165	178.7	

A4 Cell #404 (old-loaded), has been run under approximately commercial conditions for a long time, to find the rate of improvement. Here is a condensation of the results:

Charge and discharge rate: 30 amperes.

Runs #1-3		Overcharge tests	3rd run	= 167.5 to 1V.
"	4-15	7 hour charges	Average	164.2 "
"	16	15 hour charge	—	189 "
"	17	" "	—	192 "
"	18-29	7 hour charges	Average	171.9 "
"	30	15 hour charge	—	199.7 "
"	31-42	7 hour charges	Average	174.6 "
"	43	15 hour charge	—	205 "
"	44-45	7 hour charges	Average	178.8 "

The electrolyte is 21 % KOH + 120 g. SiOH.

W.E.H.

[ITEM FOUND IN BOOK]

March 24, 1909.

Mr. Edison:

A4 cells #478 – 480 (new-loaded) we gave 16 commercial runs after the first overcharge runs, - here are the results on overcharge after these commercial runs:

RUN	CHARGE	DIS.	#478 TO 1V.	#478 TO 50	#479 TO 1V.	#479 TO 50	#480 TO 1V.	#480 TO 50
25	15 hrs.@30	At 30	204.2	212	200	217.5	201.5	222
26	"	"	198.5	209.5	196.7	214.7	200	220

As you know, #478 has 90 g. LiOH, #479 has 105 g., and #480 has 120 g. — in 21 % KOH.

Here are results on new A4 cells #484 – 486, which contain #739 $Ni(OH)_2$, 28 KN + 203 BN Flake, and are filled with 21 % KOH + 120 g. LiOH, -

RUN	CHARGE	DIS.	#484 TO 1V.	#484 TO 50	#485 TO 1V.	#485 TO 50	#486 TO 1V.	#486 TO 50
1	48 hrs.@15	At 30	200	219	201.7	220.2	200	219.7
	Allowed to stand 24 hours.							
2	15 hrs@30	At 60	114	192	120	193	120	190.7
	Allowed to stand 12 hours.							
3	15 hrs.@30	At 60	110	191.5	114	192.5	110.5	191.5
	Allowed to stand 64 hours.							
4	15 hrs.@30	At 30	175	204.7	177.5	206.7	177.5	202.5
5	"	"	173.5	199	175	198.5	173.5	194.5

Results on new A4 cells #487 – 489.

RUN	CHARGE	DIS.	#487 TO 1V.	#487 TO 50	#488 TO 1V.	#488 TO 50	#489 TO 1V.	#489 TO 50	
1	48 hrs.@15	At 30	193	212.7	193	212.2	193	212.7	These cells are exactly same as #484-486 above except that they contain #9 Flake.
	Allowed to stand 24 hours								
2	15 hrs.@30	At 60	111	184.5	111	182	111	184.5	
	Allowed to stand 12 hours								
3	15 hrs.@30	At 60	110	185	111	181.7	111	184.7	
	Allowed to stand 64 hours.								
4	15 hrs.@30	At 30	170	198.2	170	196	172.5	197.5	
5	"	"	169	190	168.5	187.5	170	189.7	

W.E.H.

[ITEM FOUND IN BOOK]

Long Tubes- (32)

Cell	H. R.	H.R @250	1	2	3	
10262	350	1000	1838	1754	1688 - 2067	
10263		950	1904	1854	1792 - 2121	
* 10264		858	1679	1675	1608 - 2004	Split.
10277		842	1958	1913	1842 2163	
10278		808	1675	1808	1763 - 2146	
10279		771	1704	1675	1617 - 1971	
10280		875	1771	1750	1708 - 2071	
10281		867	1779	1750	1688 - 2017	
10282		780	1658	1654	1583 - 1842	
10286	200	729	1675	1633	1558 - 1850	
10287		761	1721	1708	1692 - 1992	
10288		742	1742	1738	1696 - 1942	
10308	150	688	1867	1863	1833 - 1938	
10309		688	1604	1768	1758 - 1888	
10310		683	1375	1733	1813 - 2004	
10311		638	1825	1829	1808 - 1892	
10312		658	1771	1771	1738 - 1833	
10313		617	1783	1792	1742 - 1854	
10340	46	504	1638	1763	1742 - 1783	
10341		396	1704	1825	1788 - 1846	

MAR 25 1909

MAR 26 1909

MAR 27 1909

[ITEM FOUND IN BOOK]

Mr. Edison:

New-loaded A4 cells #484-489, we gave five regular forming-runs at the start, then twelve commercial runs, - charging 7 hrs. at 30 amps. and discharging at 40 amps. Here are results on two overcharge runs made after the commercial runs:

Cell # 484	Run #18 - 189 to 1V., 208 to .50	Run #19 - 188.5 to 1V., 208.5 to .50V.
" 485	" 189 " 205.5 "	" 190 " 204.5 "
" 486	" 186.5 " 203 "	" 188 " 203 "
" 487	" 183 " 198.5 "	" 184 " 198.2 "
" 488	" 180 " 195 "	" 180 " 195.5 "
" 489	" 183 " 198.2 "	" 184 " 198.2 "

#484-486 have #739 $Ni(OH)_2$ and #28 XN + 203 BN Flake

#487-489 " " " " #Q Flake

Electrolyte in all is 21%. KOH + 120 g. LiOH.

New-loaded A4 cells #481-483, containing #739 $Ni(OH)_2$ and #28 XN + 203 BN Flake, had an electrolyte of 8%. KOH + 120 g. LiOH for 3 runs, and then were filled with 25%. KOH. They then had 3 more overcharge runs and 18 commercial runs, after which their capacity on overcharge was as follows:

Cell #481	Run #25 - 189.2 to 1V., 205 to .50V.	Run #26 - 192.2 to 1V., 205.5 to .50V.
" 482	" 190 " 206.2 "	" 193.2 " 207.5 "
" 483	" 188.5 " 203.5 "	" 191.5 " 204 "

[ITEM FOUND IN BOOK]

Here are summaries of tests on some old A4 cells which had no forming treatment, but were simply given runs under commercial conditions, (approximately), with an over-charge every 12 runs:

A4 # 466 + 467

#466 - Electrolyte: 21 % KOH + 120 g. LiOH.

#467 - " " " 100 g. LiOH.

Both contain #735 $Ni(OH)_2$ and #16 A Flake

RUNS	CHARGE	DISCHG.	#466	#467	REMARKS
#3	15 hrs. @ 30	At 30	165.0 to 1V.	178.0 to 1V.	
4 - 15	7 hrs. @ 30	"	165.4 "	166.1 "	Average (12 runs)
16	15 hrs. @ 30	"	196.0 "	193.5 "	
17 - 28	7 hrs. @ 30	"	175.3 "	171.9 "	Average
29	15 hrs. @ 30	"	206.7 "	203.5 "	
30 - 41	7 hrs. @ 30	"	177.5 "	174.0 "	Average
42	15 hrs. @ 30	"	211.2 "	206.0 "	

A4 # 468.

Electrolyte: 8 % KOH + 120 g. LiOH for 3 runs, - then 25 % KOH. #735 $Ni(OH)_2$ and #16 A Flake.

RUNS	CHARGE	DISCHG.	#468	REMARKS
#5	15 hrs. @ 30	At 30	171.0 to 1V.	
6 - 17	7 hrs. @ 30	"	165.4 "	Average
18	15 hrs. @ 30	"	192.5 "	
19 - 30	7 hrs. @ 30	"	170.2 "	Average
31	15 hrs. @ 30	"	202.5 "	
32 - 43	7 hrs. @ 30	"	171.3 "	Average
44	15 hrs. @ 30	"	201.5 "	

[ITEM FOUND IN BOOK]

Just before you went away you told me about running some hot-discharge experiments, on small cells which had lost capacity. We have now finisht the tests, - here are the results:

T.A.E. Tube Cells # 158, 161, + 164.

Electrolyte: 21 g. KOH + 2 g. $SiOH$.

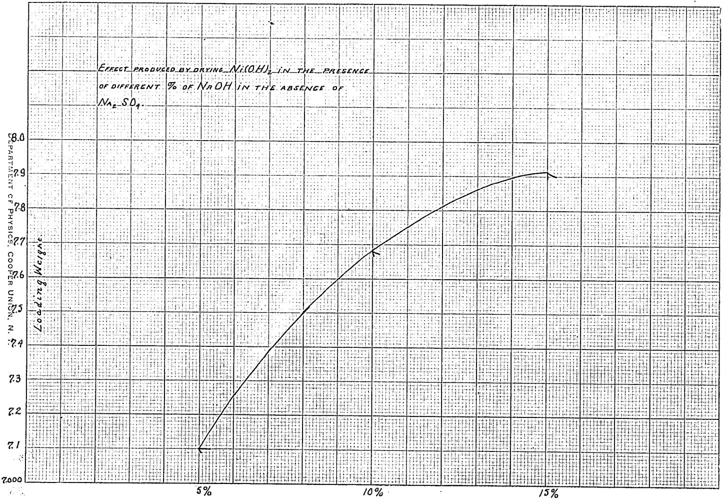
RUN	CHARGE	DISCHG.	DISCHG. TEMP.	# 158	# 161	# 164	
166	15 hrs. @ 300	At 200	Norm. (75°)	820	903	1013	
167-170	" "	"	130° F.	1218	1190	1347	Average
171-175	30 hrs. @ 150	"	"	1351	1300	1383	"
176-178	" "	"	115° F.	1233	1183	1307	"
179-181	" "	"	100° F.	1110	1053	1203	"
182-183	" "	"	Norm. (75°)	933	927	1000	"
184-186	15 hrs. @ 300	"	"	927	920	990	"

I have been doing considerable work for the Primary Battery Company. Am designing a new cell which ought to be a winner: It will have two zinc plates and three oxides, with potash or silicate electrolyte. The internal resistance will be half that of the present cell, and the amount of zinc surface, which the electrolyte can act on, will be double.

Walter E. Holland

April 3, 1909.

[ITEM FOUND IN BOOK]


EFFECT PRODUCED BY DRYING $Ni(OH)_2$ IN THE PRESENCE OF DIFFERENT % OF NaOH IN THE ABSENCE OF Na_2SO_4.
DEPARTMENT OF PHYSICS, COOPER UNION, N.
Loading Weight
8.0
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2
7.1
7.000
5%
10%
15%
PER CENT NaOH.